TRANSLATION (HM-724PCT):

Translation of WO 2005/061,143 A1 (PCT/EP2004/012,129) with Amended Pages Incorporated Therein

REEL DRIVER

The invention concerns a reel driver for rolling mills with an upper and a lower driving roll.

Reel drivers of this type are used in hot rolling mills and cold rolling mills. The lower driving roll consists of solid material, e.g., steel with a wear-resistant layer formed by buildup welding, while the upper driving roll is a hollow roll made of steel with a wear-resistant layer formed by buildup welding.

However, disadvantages associated with this have been found to be that the rolls have pores on the surface of the roll jacket, which can produce roll marks in the rolled product, that the wear-resistant layer of the rolls has only a small useful range, that the rolled strip often adheres to the rolls, and that the production of the buildup-welded roll bodies is very expensive.

JP 2-509293 B2 has already disclosed driving rolls that consist of a solid casting and an outer wear-resistant layer

applied to it by the centrifugal casting process. The upper driving roll is also designed as a solid driving roll, which requires powerful and thus expensive adjusting drives due to its great weight.

Although JP 55-068161 A has already disclosed the shrink fitting of protective layers on a roll, it does not suggest the shrink fitting of a complete cast roll body on a shaft.

WO 02/103066 A1 has already disclosed the mounting of roll jackets by means of clamping elements. However, the clamping elements are insulators that are intended to prevent the conduction of electric currents and sparking. There is no suggestion of mounting a cast jacket with clamping elements for the purpose of achieving weight savings.

The objective of the invention is to make available a reel driver with a lower driving roll made of solid material and an upper driving roll that is realized as a hollow roll, such that the driving rolls do not leave any roll marks on the rolled product.

To achieve this objective, the lower driving roll has a steel roll shaft on which a cast jacket is mounted by adhesive bonding and/or shrink fitting, and the upper driving roll has a cast jacket that is held between two clamping elements arranged on a shaft.

As a result of the use of cast jackets, the rolls have no pores in their surfaces that are in contact with the rolling stock, so that the surface of the rolling stock is not damaged when it makes contact with the driving rolls. In addition, the strip has a lesser tendency to adhere or remain stuck to the roll jacket.

It is advantageous for the cast jacket to have a working layer on the outside. This working layer can be inexpensively produced in sufficient thickness by centrifugal casting, so that the rolls have a zone of greater thickness available for grinding and a longer service life.

If the cast jacket is made of ductile iron, and the working layer is made of indefinite chill cast iron, an inexpensive jacket is obtained, which is very hard due to the indefinite chill cast iron and thus has a considerably longer service life.

If the working layer is made of chromium alloy cast iron or even of high-speed steel, even greater hardness and a longer service are obtained than with indefinite chill cast iron.

The invention is described in greater detail below with reference to the drawings.

-- Figure 1 shows a cross section through a lower driving roll.

-- Figure 2 shows a cross section through an upper driving roll.

Figure 1 shows a lower driving roll 1, which has a roll shaft 2 made of steel, on which a cast jacket 3 is mounted by adhesive bonding and/or shrink fitting. The cast jacket 3 is produced by the centrifugal casting process. Its outer periphery has a wear-resistant working layer 4.

Figure 2 shows an upper driving roll 1' with a roll shaft 2'. A cast jacket 3' is clamped on the roll shaft 2' by two clamping elements 5. The outer layer of the cast jacket 3' consists of a wear-resistant working layer 4' produced by centrifugal casting.

List of Reference Numbers

1 lower driving roll

1' upper driving roll

2 roll shaft

3 cast jacket

4 working layer

5 clamping elements

CLAIMS

1. Reel driver for rolling mills with an upper and a lower driving roll, characterized by the fact that the lower driving roll (1) has a steel roll shaft (2) on which a cast jacket (3) is mounted by adhesive bonding and/or shrink fitting, and that the upper driving roll (1') has a cast jacket (3') that is held between two clamping elements (5) arranged on a shaft (2').

2. Reel driver in accordance with Claim 1, characterized by the fact that the cast jacket (3, 3') consists of ductile iron and has an outer working layer (4, 4') produced by the centrifugal casting process.

3. Reel driver in accordance with Claim 2, characterized by the fact that the ductile iron consists of 2.5-4.0 vol.% C, 1.0-4.0 vol.% Si, 0.2-2.0 vol.% Mn, < 0.10 vol.% P, < 0.05 vol.% S, < 1.0 vol.% Cr, < 5.0 vol.% Ni, < 3.0 vol.% Mo, < 1.0 vol.% Al, and < 5.0 vol.% Cu.

4. Reel driver in accordance with any of Claims 1 to 3, characterized by the fact that the working layer (4, 4') consists of indefinite chill cast iron.

5. Reel driver in accordance with Claim 4, characterized by the fact that the indefinite chill cast iron consists of 2.7-3.8 vol.% C, 0.5-2.0 vol.% Si, 0.3-1.5 vol.% Mn, < 0.15 vol.% P, < 0.10 vol.% S, 1.0-3.5 vol.% Cr, 1.0-5.0 vol.% Ni, 0.1-0.8 vol.% Mo, 0.010-0.5 vol.% Al, and 0.5-5.0 vol.% Cu.

6. Reel driver in accordance with Claim 2 or Claim 3, characterized by the fact that the working layer (4, 4') consists of indefinite chill cast iron with alloy carbides.

7. Reel driver in accordance with Claim 6, characterized by the fact that the indefinite chill cast iron with alloy carbides consists of 2.7-3.8 vol.% C, 0.5-2.0 vol.% Si, 0.3-1.5 vol.% Mn, < 0.15 vol.% P, < 0.10 vol.% S, 1.0-3.5 vol.% Cr, 1.0-5.0 vol.% Ni, 0.1-0.8 vol.% Mo, 0.010-0.5 vol.% Al, 0.5-5.0 vol.% Cu, 0.5-4.0 vol.% V, 0.5-5.0 vol.% Nb, and 0.5-5.0 vol.% Ta.

8. Reel driver in accordance with Claim 2 or Claim 3, characterized by the fact that the working layer (4, 4') consists of chromium alloy cast iron.

9. Reel driver in accordance with Claim 8, characterized by the fact that the chromium alloy cast iron consists of 0.8-3.5 vol.% C, 0.5-2.0 vol.% Si, 0.4-3.0 vol.% Mn, < 0.15 vol.% P, < 0.10 vol.% S, 8-35 vol.% Cr, 0.5-4.0 vol.% Ni, 0.1-5 vol.% Mo, 0.5-5.0 vol.% Cu, 0.5-4.0 vol.% V, 0.5-5.0 vol.% Nb, and 0.5-5.0 vol.% Ta.

10. Reel driver in accordance with Claim 2 or Claim 3, characterized by the fact that the working layer (4, 4') consists of high-speed steel (HSS).

11. Reel driver in accordance with Claim 10, characterized by the fact that the high-speed steel consists of 0.5-3.0 vol.% C, 0.5-2.0 vol.% Si, 0.4-3.0 vol.% Mn, < 0.15 vol.% P, < 0.10 vol.% S, 2-10 vol.% Cr, 0.5-4.0 vol.% Ni, 2-10 vol.% Mo, 0.5-5.0 vol.% Cu, 2-10 vol.% V, and 1-15 vol.% W.